Math 114 Exam 2
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November 6, 2015

General guidelines

- Both the questions on this exam call for Excel work. Some of your answers belong there. Some belong on these pages. Write complete sentences where that's appropriate.
- Don't use a calculator for arithmetic when you have Excel open on your computer! Use Excel formulas like

  `=D1+D2`

  so you can change cell values and have Excel recompute everything.
- You have access to anything on your computer or the internet, class notes and other material and the text. I don't think I've asked questions that a web search will help you answer. You're free to try, of course, but don't waste time!
- After class you may improve your answers, and send me updated spreadsheets by midnight Saturday. Work independently. Don't consult with friends or classmates or tutors. The exam is posted on the course web page at `www.cs.umb.edu/~eb/114/exam2/exam2.pdf` .

1. 10 points) Instructions for turning in your work. These are not free points. To earn them you have to *follow* the instructions, not just say you've read them.
   (a) Read the general guidelines.
   (b) Turn in this paper at the end of the exam.
   (c) If you need feedback in order to decide whether to take the course pass/fail or to withdraw, be sure to say that on this paper.
   (d) Do your Excel work in a copy of the spreadsheet you will find at `www.cs.umb.edu/~eb/114/exam2/exam2.xlsx` .
   (e) Make sure your name is on this paper and in the spreadsheet!
   (f) Send me your spreadsheet as an attachment to my gmail address: `ebolker@gmail.com` with the subject line `Math 114 Exam 2`
   (g) If you are not using your own computer, save your spreadsheet on a thumb drive or send it to yourself, for safekeeping and reworking.
2. (50 points) The College Board published the table below with data about increases in tuition and fees from 2009-2010 to 2010-2011 in public four year colleges and universities. The right-hand column gives the percentage of colleges and universities that increased tuition and fees by the dollar range in the left-hand column. I've entered these data in the `CollegeCostIncrease` worksheet in the exam2 spreadsheet (link above).

Dollar Increase	Percent of Colleges
Under $200	10.8%
$200 to $399	26.8%
$400 to $599	23.4%
$600 to $799	15.4%
$800 to $999	7.9%
$1,000 to $1,199	5.0%
$1,200 to $1,399	2.5%
$1,400 to $1,599	1.4%
$1,600 to $1,799	2.4%
$1,800 to $1,999	0.8%
$2,000 to $2199	3.6%

College Cost Increase

(a) Later I'll ask you to draw a histogram of these data in Excel. Sketch a neat approximate version *here*, with proper titles and reasonable scales for both axes and a proper title for the whole chart. You don't need to draw all the bars!

(b) Draw your histogram with Excel. In what ways does it match your sketch. In what ways is it different?

(c) What is the mode increase in tuition and fees?

(d) What is the median increase in tuition and fees?

(e) Wht is the 50th percentile for these data? What is the 90th percentile?

(f) Use Excel to calculate the average (mean) increase in tuition and fees. Write your answer here.

(g) Show the mode, median and mean on your histogram sketch above.

3. Compact fluorescent bulbs.

Consumers are being encouraged to replace ordinary light bulbs with energy efficient ones — for example, compact fluorescent bulbs. (CFLs). Soon they will be required to.

A CFL uses less energy than an ordinary incandescent bulb that produces the same amount of light, but it costs more to buy. This table provides data with which you can compare the two.

bulb	initial cost	power
ordinary	\$2.00	100 watts
CFL	\$9.00	25 watts

Suppose electricity costs \$0.20 per kwh.

You can do the work for this problem using pencil and paper, a calculator, or Excel. If you use pencil and paper, use the back of this page (or a blue book) for your scratch work. If you choose Excel, use the `cfl` worksheet in the `exam2.xlsx` spreadsheet.

(a) Write a linear equation with which you can calculate the total cost C of using the ordinary bulb for H hours.

(b) What is the slope of that equation (with its units)?

(c) What is the intercept of that equation (with its units)?

(d) How much would it cost to buy the ordinary bulb and use it for 1000 hours?

(e) Write a linear equation with which you can calculate the total cost C of using the CFL for H hours.

(f) How much would it cost to buy the CFL and use it for 1000 hours?

(g) How long would you have to use the CFL to make it worth having paid the higher purchase price?

(h) Answer the previous question if the cost of electricity doubles.

(i) (A little bit of extra credit) What does "incandescent" mean? Why are incandescent light bulbs called that?